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cc:
Subject: Lord-Shope Landfill Thermal Oxidizer

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Analysis of the Lord-Shope Landfill Thermal Oxidizer

The Lord-Shope Landfill thermal oxidizer is the vapor treatment system for the in situ vapor stripping system at the site. The thermal oxidizer consists of a skid mounted system that has been designed to treat volatile organic constituents (VOCs) through combustion. The VOC laden vapor enters the thermal oxidizer via the vacuum blowers. The vapor is retained within the combustion chamber at the operating temperature of 1700 F for a residence time of 1.5 seconds, resulting in the VOC destruction efficiency of 99.9%. As necessary, the combustion chamber temperature is maintained by use of a supplemental fuel source consisting of natural gas. The treated vapors are then discharged through a 35 foot high stack.

The formation of dioxin-furan compounds are complex processes that have not been fully identified. It is believed that there are at least three different types of formation mechanisms that are possible. All of these depend on the availability of chlorinated precursor compounds in the fuel and/or waste being burned and the appropriate gas temperature conditions. Dioxin/furan concentrations appear to increase over the temperature range from 400 F to 1,000 F. However, at temperatures well above 1,000 F, dioxin/furan compounds are readily oxidized. Most dioxins and furans tend to form in control devices, especially if the gas streams leaving combustion processes are not cooled to temperatures below 400 F. Another proposed formation mechanism for dioxin/furan compounds involves reactions on the surfaces of particles entrained in the gas stream, or catalytic reactions in the fly-ash.

My conclusions on whether the thermal oxidizer at the Lord-Shope Landfill is producing high levels of dioxins are:

1. Since the thermal oxidizer operates at a temperature of 1700 F and it has a long residence time of 1.5 seconds, any dioxin that is formed during the process will most likely be destroyed by the high heat.

2. There are no additional controls to the thermal oxidizer and the effluent from the unit is probably being emitted at near combustion temperatures which is not conducive to the formation of dioxin.

3. Since only VOCs are being combusted, fly-ash is not being produced to any great extent. This is important because fly-ash may be a catalyst for dioxin production.

Monthly data of the influent and effluent from the thermal oxidizer show that at times the unit may be running below the intended efficiency of 99.9%. Because of this, the amount of VOCs and tentatively identified compounds (TICs) in the effluent is higher for those months in which the efficiency is lower. To prevent formation of products of incomplete combustion and dioxin, it is important that the thermal oxidizer is operated as intended. If not, the oxidation reactions do not go to completion because the gas stream becomes too cold or there is insufficient oxygen.

If you have any questions or concerns, please contact me at x2193.

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